

Testing for expected return and market price of risk in Chinese A and B share markets: A geometric Brownian motion and multivariate GARCH model approach

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Abstract

There exist dual listed stocks which are issued by the same company in some stock markets. Although these stocks bare the same firm-specific risks and enjoy identical dividends and voting policies, they are priced differently. Some previous studies show this seeming deviation from the law of one price can be solved by allowing different expected returns and market prices of risk for investors holding heterogeneous beliefs. This paper provides empirical evidence for that argument by testing the expected return and market price of risk between Chinese A and B shares listed in Shanghai and Shenzhen stock markets. Models with dynamic of Geometric Brownian Motion are adopted. Multivariate GARCH models are also introduced to capture the feature of time-varying volatility in stock returns. The results suggest that the different pricing can be explained by the difference in expected returns between A and B shares. However, the difference between market price of risk is insignificant for both markets if GARCH models are adopted.

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1. Introduction

Some equity markets, including both developed and emerging ones, allow listed companies to issue different types of stocks. It is common that these stocks, which are issued by the same company, share the same firm-specific risk and in most cases, also enjoy same dividends and voting policies. The only difference between these shares is the restriction to investors, i.e., who can own the stocks. One typical adoption is to segment investors by their citizenships. That is, a company can issue two types of stocks: one is available to domestic investors and the other is otherwise identical but only available to foreign investors. Such kind of segmented issuance strategy has attracted a lot of research interests, partly because of the interest in studying which benefits can be gained from the segmentation, and more importantly, because of the arising of the so-called pricing puzzle problem. It is called a puzzle in some sense because these shares have different market prices, yet they are completely identical except for holding by different investors. Hietala [17] provides a pioneering paper in this area by analyzing data for Finnish stock market and concludes that there is a

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significant price premium for foreign investors. Later, Lam and Pak [21] investigate Singaporean market, followed by Bailey [1], Bailey and Jagtiani [2], Stulz and Wasserfallen [25] and Domowitz and Madhavan [11] for studies of China, Thailand, Switzerland and Mexico market respectively. Most of these studies confirm the conclusion found by Hietala [17]: foreign investors are willing to pay a higher price than domestic ones, i.e. there exists a foreign price premium, except Bailey [1] for the case of China. All of these studies agree that there is significant price difference between shares offered to domestic and foreign investors. Later on, Bailey et al. [3] provide a survey on 11 countries. They conclude that the stock markets in all of these countries include segmentation restrictions, and foreign investors are usually facing a higher price for the shares issued by the same company, compared to domestic ones. A lot of attentions have been paid to find out the reasons for the pricing difference. Hietala [17] and others find that the difference is contributed to the different required return between domestic and foreign investors, but Bailey et al. [3] find little empirical evidence supporting this conclusion and argue that the difference is due to market liquidity, asymmetric information available to investors and other firm-specific factors. Stulz and Wasserfallen [25] conclude that the different demand elasticity for securities between domestic and foreign investors can largely explain the different pricing.

The case for Chinese stock market is more interesting. Contrary to most other stock markets which have foreign price premium, the Chinese stock market allows foreign investors to pay a much lower price than domestic ones. Bailey [1] is the first one to notice this issue and he concludes that this foreign price discount can hardly be explained by the correlation between B shares (which are available for foreign investors and have price discount compared to A shares, which are only available for domestic investors, to be discussed in detail later) returns and international stock index returns. From then, an increasing number of papers are produced on this topic, trying to explain the issue through either theoretical or empirical approaches. For example, Fernald and Rogers [13] illustrate theoretically that the B-share discount is consistent with CAPM. It is due to the higher expected return holding by foreign investors. Su [26] agrees with this conclusion via empirical approaches. He claims that the spread between expected domestic and foreign share excess returns is related to differences in individual shares' market betas. However, in the same year, Gordon and Li [15] state that the B share discount is consistent with different demand elasticity holding by domestic and foreign investors and conclude that domestic investors have more inelastic demand for stocks. Later, Sun and Tong [27] and Diao and Levi [10] also show that the discount can be explained by the different demand elasticity. Karolyi and Li [20] analyze the time series of stock data before and after February 19, 2001, on which date domestic investors are allowed to trade B shares. Their conclusion is that B-share discount is closely related to market capitalization and substantial past-return momentum, but unrelated to the firm's risk and liquidity attributes. There are also some papers that propose other explanations for price difference. For example, Sarkar et al. [23], Chen et al. [8], Chui and Kwok [9] and Yang [28] investigate the information held by domestic and foreign investors and state that the B-share discount is due to information asymmetry between segmented investors. However, these papers fail to reach agreement on which investors, foreign ones or domestic ones, are better informed. Recently, Mei et al. [22] attribute the puzzle to the different speculative motives between different investors by empirical analysis.

Thus up to now, there are a number of papers contribute to the resolution of the B-share discount problem in Chinese Stock Market, yet the conclusion is still ambiguous. This paper tries to make contribution to the literature of this foreign price discount problem by offering an empirical estimation of expected return and market price of risk for the price dynamics of A and B shares. The Geometric Brownian Motion is adopted as a benchmark and we show that under this assumption, the price difference is consistent with the difference in expected returns. In addition, we also know that market price of risk measures the tradeoff between risk and return of an asset, i.e. the increase of expected returns demanded per additional unit of risk. Basak [4] argues that investors holding heterogeneous beliefs will have different market price of risk even for the same investment. Since A and B shares have the same payoff streams but are held by different investors, we can test their market prices of risk to see whether investors' beliefs matter for the price difference. The intuition behind the analysis is straightforward: since the corresponding A and B shares are issued by the same company and have identical voting policies and dividend rights, if we take the company-specific fundamentals as given and assume that the prices of the corresponding A share and B share are derived from the fundamentals, then their market price of risk should be highly correlated. In addition, since they share the same company-specific risk, if investors view the firm-specific risk as the only risk they bear, then they should have the same market price of risk. On the other hand, if the market price of risk is not equal, it indicates that although sharing the same firm-specific risk, A and B shares are considered to be in different market risk levels and thus are expected to have different excess returns for different investors. Furthermore, besides the comparison of market price of risk for individual A–B shares, we can also stack all A share and B share returns and test the averaged market price of risk for the two groups. This test is robust to the individ-

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